

Example #14: A pendulum bob of mass 5.0 kg falls through a height of 25 cm as it swings from maximum height to lowest position.

- a) How fast is it going at the bottom?
- b) What is the energy of the bob at the bottom of the swing?
- c) What is the speed of the bob as it swings up past the bottom of its arc and rises 10 cm from the bottom position?
- d) What is the total energy at this position?
- e) What is the potential energy at this position?

→ first find E_T at start:

$$E_T = E_p = mgh = 5(9.8)(.25)$$

$$E_T = 12.25 \text{ J.}$$

a) at bottom, $E_T = E_k = \frac{1}{2}mv^2$

$$12.25 = \frac{1}{2}(5)v^2$$

$$v = 2.2 \text{ m/s}$$

b) $E_k = 12 \text{ J}$

c) $E_T = E_p + E_k$

$$12.25 = 5(9.8)(.10) + \frac{1}{2}(5)v^2$$

$$v = 1.7 \text{ m/s}$$

d) $E_T = 12 \text{ J}$

e) $E_p = 5(9.8)(.10)$

$$E_p = 4.9 \text{ J}$$

